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Reply to Office Action of June 25, 2004

### Remarks

Claims 1-12, 14-16, 18, 19, 21-25, 27, 28, 30 and 31 were rejected and claims 13, 17, 20 and 29 were objected to in the Office Action of June 25, 2004. By the present amendment, claims 2, 3, 5-7, 9, 10, 13, 14 and 28 have been amended and claims 1 and 26 have been cancelled.

### Allowable Subject Matter

Claims 13, 17, 20, 26 and 29 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (although claim 29 may also have been rejected).

Accordingly, claim 13 was amended to incorporate the subject matter of claim 1. Claim 1 was canceled. Claims 2, 3, 5-7, 9, 10 and 28 were amended to change their dependency from claim 1 to claim 13. Therefore, Applicants believe claim 13 is now in condition for allowance and request that the Examiner withdraw his rejections of claims 13.

Claims 2-12 and 27-29 depend on claim 13 and are patentable for the same reasons as claim 13. Therefore, Applicants believe claims 2-12 and 27-29 are now in condition for allowance and request that the Examiner withdraw her rejections of claims 2-12 and 27-29.

### Rejections Under 35 U.S.C. § 103(a)

Claims 14, 16, and 31 were rejected under 35 U.S.C. § 103(a) as being unpatentable by Gudat et al in view of Yamamoto et al. Applicant respectfully traverses this rejection.

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Claim 14, as amended, recites a method for determining the position of a working part of a tool on a machine. The method measures the position and orientation of a designated place on the machine spaced away from the working part of the tool and in a fixed coordinate system. The method also determines the positional relationship of the working part of the tool relative to the designated place in a machine-based coordinate system. Thirdly, the method calculates in the fixed coordinate system, at least one of an instantaneous position of the working part of the tool and an instantaneous orientation and inclination of the working part of the tool based upon the measured position and orientation of the designated place on the machine and the positional relationship of the working part of the tool relative to the designated place on the machine and, with the help of earlier calculation results, a probable position, orientation, working direction and speed a certain time in advance for the working part of the tool.

Gudat discloses a method for real-time monitoring and coordination of multiple geography-altering machines on a single work site (Page 8, lines 20-22). However, Gudat is concerned with the coordination of machines relative to each other (Page 8, lines 32-34) and is not concerned about the position of the working part of the machines in relation to the machine itself. Gudat discloses placing a positioning device of the working part to determine where that working part is relative to the other working parts on a work site (Page 28, lines 24-30) or where the tracks of the machines are relative to the other tracks (Page 28, lines 30-35) or whether the working part is in contact with the ground (Page 29, lines 10-13).

Further, Gudat calculates the position of the machines from a remote base reference station (Page 7, lines 29-30) in contrast to the claimed invention which determines the accurate position, as well as orientation of the working part, in a fixed coordination system by using a calculating device resident on the machine itself. In the claimed invention, the calculating device uses earlier calculations to calculate the probable position, orientation, direction of work and speed for the working part of the

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tool. Gudat fails to disclose a calculating device resident on the machine that uses the position, orientation and inclination of the working part of the machine as well as earlier calculations to predict the probable position, orientation, direction of work and speed for the working part of the tool.

The Examiner admits Gudat fails to teach using the inclination of the working part in calculating position and cites the abstract of Yamamoto. However, Yamamoto fails to remedy the deficiencies of Gudat. Yamamoto discloses a system that tracks and controls the position, including pitch angle, of the blade of a bulldozer (Col. 1, lines 5-9). Yamamoto fails to disclose using the pitch angle for use in determining position and orientation in a fixed coordinate system of the blade relative to the bulldozer and of other bulldozers at the work site. Instead, the purpose of tracking pitch angle in Yamamoto is to assist the operator of the bulldozer in controlling the blade for digging into the dirt at the correct angle, keeping the load of dirt within the blade while the bulldozer is in motion, and dumping the dirt at the desired location (Col. 2, lines 47-56; Col. 6, lines 4-25). The pitch angle is stored to control the position of the working part of the tool only (Col. 6, lines 40-55). It is not used to determine the location and orientation of the blade relative to the bulldozer itself nor is it used to determine the location and orientation of the blade in a fixed coordinate system.

Therefore, the limitations of claim 14 are not suggested or taught by either Gudat or Yamamoto, nor by the hypothetical combination of Gudat and Yamamoto. Nor is there any motivation to combine Gudat and Yamamoto. Consequently, Applicants assert that claim 14 is patentable over Gudat in view of Yamamoto, and requests that the Examiner withdraw her rejection of claim 14.

Claims 16 and 31 depend on independent claim 14, either directly or ultimately. These dependent claims are patentable for the same reasons as presented above. Further, the dependent claims also include additional limitations which distinguish them from the prior art.

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For example, claim 16 recites measuring the position by at least two detectors arranged to cooperate with a stationary measuring station to give the orientation in space of a designated place on the machine. These limitations are not taught nor suggested by either Gudat or Yamamoto. Gudat in view of Yamamoto discloses using a single detector to determine position, but not orientation, of the designated spot on the machine. Applicants, therefore, believe claims 16 and 31 are also patentable over Gudat in view of Yamamoto, and request that the Examiner withdraw her rejection of claims 16 and 31.

Claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Yamamoto, further in view of Diekhans. Applicants respectfully traverse this rejection.

The Examiner admits Gudat in view of Yamamoto fails to teach the position-determining apparatus that comprises a stationary measuring station placed in the vicinity of the machine and is configured to determine the position of the machine in cooperation with detector equipment where the detector equipment comprises at least two detector units placed at designated spot on the machine at fixed positions and arranged to cooperate with the stationary measuring station to give the orientation in space for the designated place on the machine. The Examiner cites Diekhans as filling in the missing teaching. Diekhans discloses an agricultural vehicle equipped with a GPS navigation receiving unit with a device that is adjustable relative to the position and orientation of the vehicle (Col. 1, lines 8-11). No motivation exists to combine Gudat with Yamamoto and Diekhans "in order to optimize the operation of the vehicle." There is no suggestion of optimization in any of the references, nor is there any other reason evident in the references which would lead to a combination. Rather, this is simply an impermissible hindsight combination of Gudat, Yamamoto and Diekhans.

In addition, claim 19 depends from the independent claims 14 either directly or ultimately. This dependent claim is patentable for the same reasons as presented

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above with respect to the claim from which it depends. Applicants believe that claim 19 is patentable over the prior art and request that the Examiner withdraw her rejection of claim 19.

Claims 15 and 30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Yamamoto, further in view of Ford. Applicant respectfully traverses this rejection.

The Examiner admits Gudat in view of Yamamoto fails to teach the north-seeking/target unit and cites Ford. Ford discloses a navigational systems for ships and aircraft which determines pitch, azimuth, and position (Col. 1, lines 13-16). Additionally, Ford discloses north-seeking gyroscopes in determining pitch and heading of a ship or aircraft as prior art in the background section (Col. 1, lines 19-21). There is no motivation to combine Gudat, Yamamoto and Ford. It would not be obvious to combine a navigational system of a ship or an aircraft with a heavy land-based machinery in order "to enhance the system." Ships and aircraft tend to move at much quicker speeds and over greater distances than slow and heavy, land-based machinery. Further, such heavy, land-based machinery generally do not require navigational systems as sophisticated as those for ships and aircraft. The combination of the references is not suggested anywhere in their disclosures.

In addition, claims 15 and 30 depend on independent claims 14 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional limitations which distinguish them from the prior art as was discussed above. Applicants believe that claims 15 and 30 are patentable over the prior art and request the Examiner withdraw her rejection of claims 15 and 30.

Claims 18 and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Yamamoto, further in view of Johnson. Applicant respectfully

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traverses this rejection.

The Examiner admits Gudat in view of Yamamoto fails to teach "the optical unit aligning itself towards the stationary measuring station with help" and cites Johnson. Johnson discloses a passive stationary infrared optical communications system to be used at high speeds between two computer systems preferably in the airline industry (Col.13, lines 28-33). Claim 18 calls for the method by which this is accomplished. This limitation is not suggested or taught by Gudat, Yamamoto or Johnson nor it is suggested or taught by a hypothetical combination of Gudat, Yamamoto and Johnson. Additionally, claim 20 recite measuring both position and orientation by providing a geodesic instrument with target-seeking function placed at a distance from the machine and measuring against at least one target on the machine. This limitation is also not suggested or taught by Gudat, Yamamoto or Johnson, nor by a hypothetical combination of Gudat, Yamamoto and Johnson. Further, there is no motivation to combine Gudat, Yamamoto and Johnson. It would not be obvious to combine a communication system of a an aircraft with a heavy, land-based machinery in order "to enhance the system" since heavy, land-based machinery typically do not travel at speeds or over the distances that high-speed aircraft do and, therefore, do not require communication systems as sophisticated as those for aircraft. Additionally, the manner in which this enhancement is to be effected is far from clear.

In addition, claims 18 and 20 depend from the independent claim 14 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional limitations which distinguish them from the prior art as was discussed above. Applicants believe that claims 18 and 20 are patentable over the prior art and request the Examiner withdraw her rejection of claims 18 and 20.

Claim 22 was rejected under 35 U.S.C. § 103(a) as being unpatentable over

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Gudat in view of Yamamoto, further in view of Schupfner. Applicant respectfully traverses this rejection.

The Examiner admits Gudat in view of Yamamoto fails to teach "how to calculate the angular position relative to the map" and cites Schupfner as providing this missing disclosure. However, Schupfner fails to remedy the deficiencies of Gudat in view of Yamamoto. Schupfner discloses a method for calibrating an angle sensor in a navigation system that is influenced by the operating temperature of the system (Col. 1, lines 66-67, Col. 2, Lines 1-5). Schupfner does not disclose storing a map and, therefore, it does not disclose relating angular calibrations to a stored map. Consequently, the limitations of claim 22 are not suggested or taught by Gudat, Yamamoto or Schupfner or by the hypothetical combination of Gudat, Yamamoto and Schupfner. Nor is there any motivation to combine Gudat, Yamamoto and Schupfner. It would not be obvious to combine a method for calibrating an angle sensor in a navigation system influenced by the temperature with a heavy, land-based machinery in order "to enhance the system."

In addition, claim 22 depends from the independent claim 14 either directly or ultimately. This dependent claim is patentable for the same reasons as presented above with respect to the claim from which it depends. Further, the dependent claim also includes additional limitations which distinguishes it from the prior art as was discussed above. Applicants believe that claim 22 is patentable over the prior art and request the Examiner withdraw her rejection of claim 22.

Claim 21 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Yamamoto, in view of Johnson further in view of Ford. Applicant respectfully traverses this rejection.

The Examiner admits Gudat in view of Yamamoto, in view of Johnson, further in view of Ford fails to teach the north-seeking/target unit, and cites Ford as teaching such a unit. It is the Applicant's position, however, that Ford fails to remedy the deficiencies

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of Gudat in view of Yamamoto, further in view of Johnson. As discussed above, Johnson discloses a passive stationary infrared optical communications system to be used at high speeds between two computer systems preferably in the airline industry (Col. 3, lines 28-33) and Ford discloses a navigational systems for ships and aircraft which determines pitch, azimuth, and position (Col. 1, lines 13-16). In addition, Ford discloses north-seeking gyroscopes in determining pitch and heading of a ship or aircraft as the prior art in the background section (Col. 1, lines 19-21). However, claim 21 does not recite a north seeking target as disclosed in the background section of Ford cited by the Examiner. Consequently, the limitations of claim 21 are not suggested or taught by Gudat in view of Yamamoto, further in view of Johnson or Ford or by the hypothetical combination of Gudat in view of Yamamoto, further in view of Johnson and Ford. Nor is there any motivation to combine Gudat in view of Yamamoto, further in view of Johnson and Ford. It would not be obvious to combine navigational and communication systems of a ship or an aircraft with a heavy land-based machinery in order "to enhance the system" since ships and aircraft tend to move at much quicker speeds and over greater distances than slow and heavy land-based machinery. Additionally, claim 21 depends ultimately from the independent claim 14. This dependent claim is patentable for the same reasons as presented above with respect to the claim from which it depends. Applicants believe that claim 21 is patentable over the prior art and request the Examiner withdraw her rejection of claim 21.

Claim 23 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Yamamoto, further in view of Ethridge. Applicant respectfully traverses this rejection.

The Examiner admits Gudat in view of Yamamoto fails to teach "an accurate device that measures the actual position of the vehicle at time intervals" and cites Ethridge. No motivation exists to suggest or teach the combination of Gudat in view of Yamamoto, further in view of Ethridge in order "to enhance the system." Gudat



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discloses determining the position of land-based heavy machinery whereas Ethridge discloses a wearable computer that provides positional guidance to parachute jumpers jumping in the dark (Col. 1, lines 56-63). Land-based, heavy machinery and computers for parachute jumpers are two very different technical art areas with very different objectives.

Additionally, claim 23 depends from the independent claim 14. This dependent claim is patentable for the same reasons as presented above with respect to the claims from which it depends. Further, the dependent claim also includes additional limitations which distinguishes it from the prior art. Applicants believe that claim 23 is patentable over the prior art and request the Examiner withdraw her rejection of claim 23.

Claim 24 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Yamamoto, in view of Ethridge further in view of Vanderwerf. Applicant respectfully traverses this rejection.

The Examiner admits Gudat in view of Yamamoto, further in view of Ethridge fails to teach "how to calculate the vehicle acceleration and how to integrate the acceleration" and cites Vanderwerf. No motivation exists to suggest or teach the combination of Gudat in view of Yamamoto, in view of Ethridge further in view of Vanderwerf. Vanderwerf discloses a navigational system for mounting on a vehicle, preferably on aircraft, that compensates for gravity deflections (Col. 2, lines 19-24). It would not be obvious to combine a navigational a systems of an aircraft or positional guidance to parachute jumpers jumping in the dark with a system used on heavy, land-based machinery in order "to enhance the system" since these are very different technical areas.

In addition, claim 24 depends from the independent claim 14 either directly or ultimately. This dependent claim is patentable for the same reasons as presented above with respect to the claim from which it depends. Further, the dependent claim also includes additional limitations which distinguishes it from the prior art. Applicants

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believe that claim 24 is patentable over the prior art and request the Examiner withdraw her rejection of claim 24.

Claim 25 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gudat in view of Yamamoto, in view of Ethridge, further in view of Yamada. Applicant respectfully traverses this rejection.

The Examiner admits Gudat in view of Yamamoto, further in view of Ethridge fails to teach the subject matter of claim 25, and cites Yamada as teaching it "in the abstract." However, Yamada fails to remedy the deficiencies of Gudat in view of Yamamoto, further in view of Ethridge. It is not clear whether the Examiner is referring to the "Abstract" portion of the Yamada reference or to an abstract teaching. If the latter is the case, there is no explanation of the combination, nor why it would be made "to enhance the system."

Claim 25 discloses, in part, a system comprising a fast determining device with at least one rotation-indicating device for rotation around at least one axis of the machine.

Yamada discloses a navigation unit where the gyro sensor automatically aligns itself in the vertical direction regardless of how the system is mounted (Col. 1, lines 50-54). However, Yamada fails to disclose a relatively fast gyro sensor with at least one rotation-indicating device - either abstractly or concretely. Therefore, none of the references discloses the limitations in the claim 25.

Nor does the hypothetical combination of Gudat in view of Yamamoto, further in view of Ethridge and Yamada suggest or teach a relatively fast gyro sensor with at least one rotation-indicating device. Therefore, the hypothetical combination of Gudat in view of Yamamoto, further in view of Ethridge and Yamada does not suggest or teach all the limitations of the claimed invention. Nor is there any motivation to combine Gudat in view of Yamamoto, in view of Ethridge further in view of Yamada. Applicant believes that claim 25 is patentable over the prior art and requests the Examiner withdraw her

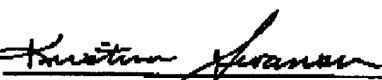
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rejection of claim 25.

In addition, claim 25 depends from the independent claims 14 either directly or ultimately. This dependent claim is patentable for the same reasons as presented above with respect to the claim from which it depends. Further, the dependent claim also includes additional limitations which distinguish it from the prior art as was discussed above. Applicants believe that claim 25 is patentable over the prior art and request the Examiner withdraw her rejection to claim 25.

For the above reasons, the Applicant respectfully submits that the above claims represent allowable subject matter. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,  
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